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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|---|---|---|---|
| 10/581,995 | 06/07/2006 | Johan Nystrom | 2380-1180 | 1873 |

23117 7590 03/25/2009

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| EXAMINER | |
|---|---|
| MEW, KEVIN D | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 2416 | |

| MAIL DATE | DELIVERY MODE |
|---|---|
| 03/25/2009 | PAPER |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/581,995 | NYSTROM ET AL. | |
| | Examiner | Art Unit | |
| | Kevin Mew | 2416 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *07 June 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *32-66* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *32,33,36-53 and 56-66* is/are rejected.

7)☒ Claim(s) *34,35,54 and 55* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *6/7/2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *6/7/06, 1/30/08*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

## *Detailed Action*

### *Claim Objections*

1. Claims 32 are objected to because of the following informalities:

In line 2, claim 32, replace "utilising" with "utilizing."

In line 4, claim 36, replace "unsynchronised" with "unsynchronized."

In line 3, claim 41, replace "unsynchronised" with "unsynchronized."

In line 2, claim 42, replace "unsynchronised" with "unsynchronized."

In line 2, claim 46, replace "unsynchronised" with "unsynchronized."

In line 2, claim 49, replace "unsynchronised" with "unsynchronized."

In line 2, claim 50, replace "unsynchronised" with "unsynchronized."

In line 7, claim 52, replace "unsynchronised" with "unsynchronized."

In line 9, claim 56, replace "unsynchronised" with "unsynchronized."

In line 7, claim 62, replace "unsynchronised" with "unsynchronized."

In line 10, claim 66, replace "unsynchronised" with "unsynchronized."

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 32, 36-43, 46-53, 56-65 are rejected under 35 U.S.C. 102(e) as being anticipated by Shattil (US Publication 2008/0095121).

Regarding claim 32, Shattil discloses method for communication between nodes in a multi-carrier system (a plurality of carriers, paragraph 0018), utilizing a set of carriers and having a predetermined symbol length (CI signals having a time offset equivalent to CI carrier set with carriers 1 to N, paragraphs 0145), the method comprising the steps of:

- reserving a sub-set of carriers (a plurality of CI carriers, paragraph 0153) for communication between unsynchronized nodes, at least one respective carrier of said sub-set of carriers being assigned to nodes in the multi-carrier system (CI carriers assigned to a particular user, paragraph 0153), whereby a relation between node identity of said nodes and said at least one carrier being created (CI carriers corresponds to any particular user, paragraph 0153);

- transmitting a sinusoidal signal (CI signal, paragraph 0139 and Fig. 1A), being phase-continuous (CI signal is periodic, paragraph 0141), on said at least one carrier of the sub-set of carriers (on a set of carriers, paragraph 0139, 0140) for a first node during a predetermined transmission period (CI signal is periodic with a period, paragraph 0141), the predetermined transmission period corresponding to the duration of n consecutive ones of the predetermined

symbol length, where n is an integer larger than 1 (represents information symbols located sequentially in time, paragraph 0144),

- receiving the transmitted sinusoidal signal in a second node (receiving CI signal at the CI decoder, paragraph 0192); and

- interpreting the received sinusoidal signal, in turn comprising associating at least a frequency of the received sinusoidal signal with information about the identity of the first node (associating multi-frequency on the multicarrier-based CI signal, paragraph 0139), whereby the existence of the first node within radio communication distance is concluded (interpreting CI codes to identify each of the radio devices, paragraph 0269).

Regarding claim 36, Shattil discloses method according to claim 32, comprising the further steps of:

- altering characteristics of the sinusoidal signal in the first node between consecutive ones of the predetermined transmission periods in accordance with a coding of data to be sent between unsynchronized nodes (adjusting the carriers of the CI signal based on the time-domain characteristics such as a direct-sequence code, paragraph 0133);

- decoding the received sinusoidal signal in the second node to obtain the sent data (decoding the received coded signal to obtain the desired information signal, paragraph 0117).

Regarding claim 37, Shattil discloses method according to claim 36, wherein the decoding is performed on every n:th received symbol (decoding an nth data symbol, paragraph

0197).

Regarding claim 38, Shattil discloses method according to claim 37, wherein the coding involves an amplitude change between the sinusoidal signal of two consecutive ones of the predetermined transmission periods (CI code involves a pulse amplitude modulation PAM, paragraph 0124).

Regarding claim 39, Shattil discloses method according to claim 38, wherein the coding involves switching off and switching on, respectively, the sinusoidal signal of two consecutive ones of the predetermined transmission periods (CI code involves pulse code modulation, paragraph 0123).

Regarding claim 40, Shattil discloses method according to claim 37, wherein the coding involves a phase shift between the sinusoidal signal of two consecutive ones of the predetermined transmission periods (CI code depends on the phase relationship between orthogonal sinusoidal waveforms over particular symbol intervals, paragraph 0161).

Regarding claim 41, Shattil discloses method according to claim 36, wherein a sinusoidal signal is transmitted on at least two carriers of the predetermined sub-set of carriers, whereby the coding of data to be sent between unsynchronized nodes utilises the at least two carriers of the predetermined sub-set of carriers (CI code utilizes orthogonal carriers, paragraphs 0160, 0161).

Regarding claim 42, Shattil discloses method according to claim 41, wherein the coding of data to be sent between unsynchronized nodes utilises time differences between the onset of the sinusoidal signal of at least two of the at least two carriers of the predetermined sub-set of carriers (CI code depends on the phase relationship between orthogonal sinusoidal waveforms over particular symbol intervals, paragraph 0161).

Regarding claim 43, Shattil discloses method according to claim 32, wherein the first node is a base station and the second node is a mobile terminal (base station and subscriber units, paragraph 0050 and Fig. 10D).

Regarding claim 46, Shattil discloses method according to claim 43, wherein the data to be sent between unsynchronized nodes comprises data selected from the list of: load indication (load balancing, paragraph 0272); and possible random access channels (transmission path selection, paragraph 0272).

Regarding claim 47, Shattil discloses method according to claim 32, wherein both the first node and the second node are base stations, whereby the data to be sent between unsynchronized nodes comprises data assisting in procedures of synchronising base stations (synchronization, paragraph 0272).

Regarding claim 48, Shattil discloses method according to claim 32, wherein both the first node and the second node are mobile terminals (communication between subscriber units

using CI codes, page 20, claim 1, lines 1-12).

Regarding claim 49, Shattil discloses method according to claim 32, wherein the carriers of the sub-set of carriers reserved for communication between unsynchronized nodes are distributed over the frequency band of the set of carriers (CI carriers are distributed over a large system bandwidth, paragraph 0153).

Regarding claim 50, Shattil discloses method according to claim 32, wherein the carriers of the sub-set of carriers reserved for communication between unsynchronized nodes are equidistant in frequency (CI carriers are equally spaced in frequency, paragraph 0140).

Regarding claim 51, Shattil discloses method according to claim 32, wherein the multi-carrier system is a orthogonal frequency division multiplexing system (OFDM system, paragraph 0173).

Regarding claim 52, Shattil discloses node, being a multi-carrier wireless-communication system node, comprising:

- signal processor arranged to provide signals having a predetermined symbol length on a set of carriers (CI signals having a time offset equivalent to CI carrier set with carriers 1 to N, paragraphs 0145); and

- transmitter arranged to transmit the signals provided by the signal processor, a predetermined sub-set of carriers being reserved for communication between unsynchronized

nodes (a plurality of CI carriers, paragraph 0153), at least one respective carrier of said sub-set of carriers being assigned to nodes in the multi-carrier system (CI carriers assigned to a particular user, paragraph 0153), whereby a relation between node identity of said nodes and said at least one carrier being created (CI carriers corresponds to any particular user, paragraph 0153), the signal processor being further arranged to provide a sinusoidal signal (CI signal, paragraph 0139 and Fig. 1A), being phase-continuous (CI signal is periodic, paragraph 0141), on said at least carrier assigned to the node (on a set of carriers, paragraph 0139, 0140) during a predetermined transmission period (CI signal is periodic with a period, paragraph 0141) of n times the predetermined symbol length, where n is an integer larger than 1 (represents information symbols located sequentially in time, paragraph 0144).

Regarding claim 53, Shattil discloses node according to claim 52, wherein the signal processor comprises means for inverse Fourier transform (inverse Fourier transform, paragraph 0117).

Regarding claim 56, Shattil discloses node, being a multi-carrier wireless-communication system node, comprising:

- receiver arranged to receive signals having a predetermined symbol length on a set of carriers (CI signals having a time offset equivalent to CI carrier set with carriers 1 to N, paragraphs 0145); and

- signal processor arranged to process the signals provided by the receiver, the signal processor being further arranged to:

- detect any existence of a sinusoidal signal (CI signal, paragraph 0139 and Fig. 1A), being phase-continuous (CI signal is periodic, paragraph 0141), on at least one of a predetermined sub-set of carriers (on a set of carriers, paragraph 0139, 0140), the predetermined sub-set of carriers being reserved for communication between unsynchronized nodes (a plurality of CI carriers, paragraph 0153), at least one respective carrier of said sub-set of carriers being assigned to nodes in the multi-carrier system (CI carriers assigned to a particular user, paragraph 0153), whereby a relation between node identity of said nodes and said at least one carrier being created (CI carriers corresponds to any particular user, paragraph 0153); and

- interpret at least a frequency of the received sinusoidal signal (associating multi-frequency on the multicarrier-based CI signal, paragraph 0139) as information about the identity of a node transmitting the received sinusoidal signal (CI codes to identify each of the radio devices, paragraph 0269).

Regarding claim 57, Shattil discloses node according to claim 56, wherein the signal processor comprises means for Fourier transform (Fourier transform, paragraph 0117).

Regarding claim 58, Shatill discloses node according to claim 57, wherein the signal processor comprises means for detecting intensity on any output from the means for Fourier transform corresponding to the predetermined sub-set of carriers (data symbols are obtained from the output bins of the Fourier transform process, paragraph 0117).

Regarding claim 59, Shattil discloses node according to claim 56, wherein the multi-carrier system is a orthogonal frequency division multiplexing system (OFDM system, paragraph 0173).

Regarding claim 60, Shattil discloses node according to claim 56, wherein the node is a base station (base station, paragraph 0269).

Regarding claim 61, Shattil discloses node according to claim 56, wherein the node is a mobile terminal (subscriber unit, paragraph 0269).

Regarding claim 62, Shattil discloses a wireless communications system having a node, said node comprising:

- signal processor arranged to provide signals having a predetermined symbol length on a set of carriers (CI signals having a time offset equivalent to CI carrier set with carriers 1 to N, paragraphs 0145); and

- transmitter arranged to transmit the signals provided by the signal processor, a predetermined sub-set of carriers being reserved for communication between unsynchronized nodes (a plurality of CI carriers, paragraph 0153), at least one respective carrier of said sub-set of carriers being assigned to nodes in the multi-carrier system (CI carriers assigned to a particular user, paragraph 0153), whereby a relation between node identity of said nodes and said at least one carrier being created (CI carriers corresponds to any particular user, paragraph 0153), the signal processor being further arranged to provide a sinusoidal signal (CI signal, paragraph 0139

and Fig. 1A), being phase-continuous (CI signal is periodic, paragraph 0141), on said at least carrier (on a set of carriers, paragraph 0139, 0140) assigned to the node during a predetermined transmission period (CI signal is periodic with a period, paragraph 0141) of n times the predetermined symbol length, where n is an integer larger than 1 (represents information symbols located sequentially in time, paragraph 0144).

Regarding claim 63, Shattil discloses node according to claim 52, wherein the multi-carrier system is a orthogonal frequency division multiplexing system (OFDM system, paragraph 0173).

Regarding claim 64, Shattil discloses node according to claim 52, wherein the node is a base station (base station, paragraph 0269).

Regarding claim 65, Shattil discloses node according to claim 52, wherein the node is a mobile terminal (subscriber unit, paragraph 0269).

Regarding claim 66, Shattil discloses a wireless communications system having a node, said node comprising:

- receiver arranged to receive signals having a predetermined symbol length on a set of carriers (CI signals having a time offset equivalent to CI carrier set with carriers 1 to N, paragraphs 0145); and

- signal processor arranged to process the signals provided by the receiver, the signal processor being further arranged to:

- detect any existence of a sinusoidal signal, being phase-continuous, on at least one of a predetermined sub-set of carriers, the predetermined sub-set of carriers being reserved for communication between unsynchronized nodes (a plurality of CI carriers, paragraph 0153), at least one respective carrier of said sub-set of carriers being assigned to nodes in the multi-carrier system (CI carriers assigned to a particular user, paragraph 0153), whereby a relation between node identity of said nodes and said at least one carrier being created (CI carriers corresponds to any particular user, paragraph 0153); and

- interpret at least a frequency of the received sinusoidal signal (associating multi-frequency on the multicarrier-based CI signal, paragraph 0139) as information about the identity of a node transmitting the received sinusoidal signal (interpreting CI codes to identify each of the radio devices, paragraph 0269).

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil in view of Maehata et al. (USP 6,816,452).

Regarding claim 33, Shattil discloses all aspects of claim 32 above. Shattil may not explicitly show method according to claim 32, wherein the step of interpreting the received sinusoidal signal comprises the further steps of:

- deriving a relative Doppler as a frequency difference between the received sinusoidal signal and an expected frequency associated to the first node; and

- associating the relative Doppler to a velocity component of the second node in the direction of the first node.

However, Maehata teaches Doppler shift is based on a shift in the received frequency (col. 4, lines 57-64) and the Doppler shift increases with the increase the of the velocity of the vehicle (col. 4, lines 23-27).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Shattil with the teaching of Maehata in disclosing Doppler shift is based on a shift in the received frequency and the Doppler shift increases with the increase the of the velocity of the vehicle such that the system of Shattil will show the step of interpreting the received sinusoidal signal comprises the further steps of: deriving a relative

Doppler as a frequency difference between the received sinusoidal signal and an expected frequency associated to the first node; and associating the relative Doppler to a velocity component of the second node in the direction of the first node.

The motivation to do so is to for the control station to determine a subcarrier arrangement so as to enlarge the space between frequencies of subcarriers of the OFDM based on the detected velocity of a moving vehicle.

4. Claim 44 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil in view of Laroia et al. (USP 7,363,039).

Regarding claim 44, Shattil discloses all aspects of claim 43 above. Shattil may not disclose method according to claim 43, wherein the data to be sent between unsynchronized nodes comprises data assisting in procedures of changing base station.

However, Laroia teaches that system parameter information include carrier frequency assignments to specific base stations (col. 20, lines 26-32, col. 6, lines 45-52).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Shattil with the teaching of Laroia in disclosing carrier information include carrier frequency assignments to specific base stations such that the data to be sent between unsynchronized nodes comprises data assisting in procedures of changing base station.

The motivation to do so is to assign carrier frequency to allow a carrier selection based on boundary interference levels.

Claim 45 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shattil in view of Kanemoto et al. (US Publication 2002/0159426).

Regarding claim 45, Shattil discloses all aspects of claim 43 above. Shattil may not disclose method according to claim 43, wherein the data to be sent between unsynchronized nodes comprises data assisting in paging procedures.

However, Kanemoto teaches paging information undergoes channel coding on a OFDM multicarrier communication system (paragraphs 0029, 0049, 0074).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the system of Shattil with the teaching of Kanemoto in paging information undergoes channel coding on a OFDM multicarrier communication system such that the data to be sent between unsynchronized nodes comprises data assisting in paging procedures.

The motivation to do so is to make efficient use of code resources in a multicarrier communication system.

### *Allowable Subject Matter*

5. Claims 34-35, 54-55 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

In claim 34, method according to claim 33, wherein the step of interpreting the received sinusoidal signal comprises the steps of: associating a sign of the relative Doppler to information about if the second node moves towards or away from the first node.

In claim 35, method according to claim 32, wherein the step of interpreting the received sinusoidal signal comprises the steps of: - deriving a relative path loss as an averaged received signal strength compared with a transmission strength of the first node; and

- associating the relative path loss to an estimate of the distance between the first and second nodes.

In claim 54, node according to claim 53, wherein the signal processor further comprises:

- means for switching off outputs from an encoder corresponding to the predetermined sub-set of carriers; and

- signal generator providing a sinusoidal signal corresponding to a carrier in the predetermined sub-set of carriers being associated with the node,

- adder means, arranged to add the output signals from the signal generator and the means for inverse Fourier transform.

In claim 55, node according to claim 53, wherein the signal processor further comprises:

- means for switching off outputs from an encoder corresponding to carriers of the predetermined sub-set of carriers not being associated with the node; and

- means for providing a rotation of the data symbol of the input to the means for inverse Fourier transform corresponding to carriers of the predetermined sub-set of carriers not being

associated with the node, the rotation compensating for a phase rotation during cyclic prefix and roll on/off periods for the carrier in question.

***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kevin Mew whose telephone number is 571-272-3141. The examiner can normally be reached on 9:00 am - 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham can be reached on 571-272-3179. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chi H Pham/
Supervisory Patent Examiner, Art Unit 2416
3/23/09

/K. M./
Examiner, Art Unit 2416